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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DON E. CURRY and JEFFREY E. FLETCHER

Appeal 2009-000993
Application 09/828,067
Technology Center 1700

Decided:¹ June 18, 2009

Before BRADLEY R. GARRIS, KAREN M. HASTINGS, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 29-35, and 38-57. The claims on appeal have been

¹The two-month time period for filing an appeal or commencing a civil action, as recited in 37 CFR § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

limited by Appellants to claims 29, 40, 42, and 47.² (*see*, App. Br. 3, 6).

We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

BACKGROUND

The invention relates to a wafer processing apparatus.

Claim 42 is illustrative (emphasis added):

42. A wafer processing apparatus, comprising:

- a processing chamber defined by a lower wall, an upper wall and side walls extending from the lower wall to the upper wall;
- a susceptor in the processing chamber on which the wafer can be located so that an upper surface of the wafer faces the upper wall;
- a manifold component located on the processing chamber and, together with the upper surface of the upper wall, defining a manifold cavity;

- an exhaust system comprising an exhaust line connected to the processing chamber, for flowing an exhaust gas from the processing chamber;

- a processing gas supply line connected to the manifold component;*

- a plurality of processing gas supply openings distributed non-uniformly in the upper wall providing a means for supplying a processing gas from the manifold cavity to the processing chamber, wherein the processing gas comprises non-depleted reactive gases used for processing the wafer, wherein the exhaust gas comprises reacted gases and depleted processing gas, wherein the processing gas supply openings are non-uniformly distributed over the upper wall, wherein the processing gas supply openings, the manifold cavity and component, processing gas supply, and exhaust system predominantly*

² The BPAI does not have jurisdiction as to non-appealed claims 30-35, 38, 39, 41, 43-46, and 48-57 (App. Br. 3). Claims that are clearly indicated by appellant in the Appeal Brief as not being appealed should be canceled. *Ex Parte Ghuman*, 2008 WL 2109842 (BPAI 2008) (precedential). Consequently, the Examiner should cancel all non-appealed claims upon return of this case to the Examiner.

determine the flow pattern of processing gas onto the upper surface of the wafer.

The Examiner has rejected claims 29, 42 and 47 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Itsudo³ and Sivaramakrishnam.⁴ The Examiner has rejected claim 40 over the combined teachings of Itsudo, Sivaramakrishnam and Nguyen⁵.

Appellants present arguments concerning rejected independent claims 29, 42, and 47 as a group (Br. 4-13), and only argue claim 40 (which depends from claim 29) separately. However, dependent claim 40 recites a limitation similar to one of the limitations in independent claim 42⁶. Thus, our discussion will mainly focus on independent claim 42.

ISSUE

Have Appellants shown reversible error in the Examiner's conclusion of obviousness because the applied prior art does not teach or suggest "a *processing gas* supply line connected to the manifold component . . . wherein the *processing gas comprises non-depleted reactive gases* used for processing the wafer" of claim 42 (emphasis added)? This issue turns on whether the term "processing gas", as well as the term "non-depleted reactive gases" are "structural limitations" as argued by Appellants (*see, e.g.,* App. Br. 21, 22; Reply Br. 13, 14).

We answer this question in the negative, and find that the terms "processing gas" and "non-depleted reactive gases" only limit the claims to

³ Japanese Patent 05-198512 (as translated) issued June 08, 1993.

⁴ US Patent 5,531,183 issued Jul. 02, 1996.

⁵ US Patent 6,444,039 B1 issued Sep. 03, 2002.

⁶ The Examiner apparently relied upon Nguyen in the rejection of claim 40 to exemplify the obviousness of angular displacement of gas openings (Ans. 9). However, no such limitation is recited in claim 40.

the extent that that the prior art structure must be capable of handling such processing gases as claimed.

FINDINGS OF FACT (FF)

Findings of fact throughout this opinion are supported by a preponderance of the evidence.

Appellants admit as prior art the apparatus of Figure 1 reproduced below:

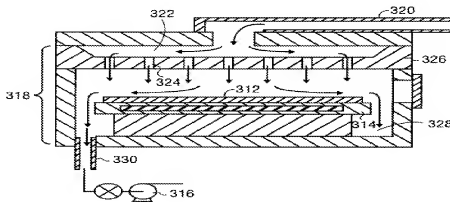


FIG. 1
(PRIOR ART)

Fig. 1 depicts a wafer processing apparatus wherein a wafer 12 is located on a susceptor (i.e., a support) 314. “A processing gas flows through a gas supply line 320 into a manifold cavity 322” and then through uniformly spaced openings 324 into the chamber 312 (Spec. 2, para. [0002]).

Appellants’ Specification provides no definition of the term “processing gas”. The only occurrence of this term in Appellants’ Specification is in the sentence quoted above (*id.*).

Appellants’ Specification also provides no definitions of the terms “reactive gases” and “non-depleted reactive gases”. The only occurrence of

these terms is in the claims as amended during prosecution (see, e.g., Amendment filed Jan. 5, 2006).

Appellants describe that as a result of the location of exhaust line 330 in the admitted Prior Art of Fig. 1, a higher flowrate occurs over the left of the wafer than the right of the wafer, and that as the wafer is processed the layer 332 is thicker on the right-hand side of the wafer (Spec. 3, para. [0004]).

Appellants describe as their invention various ways to solve the problem of uneven flowrates in the chamber (Spec. 4-5, paras. [0006]-[0007]). One solution is to provide non-uniform distribution of openings into the wafer processing chamber (*id.*).

Appellants' Figure 10 illustrates their improved wafer processing apparatus:

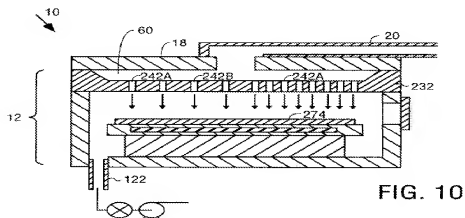


Fig. 10 is virtually identical to prior art Fig. 1 except that the openings (labeled 242A and 242B) are non-uniformly distributed such that more openings are located in the right-hand half of the chamber to increase the flowrate therein and thereby counteracting the tendency for the flow to be

higher over the left hand side of the wafer (Spec. 12-13, paras. [0034], [0035]).

The Examiner correctly found that Itsudo describes a wafer processing apparatus wherein an inert processing gas is non-uniformly distributed through a plurality of openings from a manifold into a wafer processing chamber in order to solve a similar problem as Appellants; that is, uneven gas flow and concomitant uneven layer deposition upon the wafer (Itsudo, e.g., Figs. 6, 8; p. 3-4, paras. [0002]-[0004]; e.g., Ans. 3-6).

Figure 6 of Itsudo is reproduced below (text added):

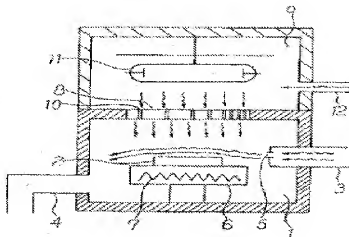


Figure 6

Fig. 6 of Itsudo depicts a photo-CVD (chemical vapor deposition) device wherein an inert processing gas is supplied through a supply line 12 which enters via an opening in the light source chamber 9 (i.e., manifold) and non-uniformly distributed via holes 10 in gas spray plate 8 (Itsudo p. 4, para. [0004]). The wafer is processed in chamber 1 on support 6 and reaction gas enters via supply line 3 and gases are exhausted at exhaust outlet 4 (*id.*). A light source 11 is located in chamber/manifold 9 to irradiate the substrate 2 (i.e., wafer) with light (*id.*).

The Examiner stated that Sivaramakrishnam was added to the teachings of Itsudo only to meet the claim limitation of the gas supply line opening being ““formed through an upper surface of the manifold cavity”” (claim 29; Ans. 20) because the Examiner believed Itsudo’s gas injection source at 12 did not meet this limitation (Ans. 20).

Appellants’ Specification provides no definition for the term “an upper surface” (*see generally* Spec.).

Itsudo’s gas supply line is formed through an upper surface of the manifold component/chamber 9 (*see* Fig. 6).

Independent claims 42 and 47 do not require that the gas supply line opening is “formed through an upper surface of the manifold cavity” as recited in claim 29; instead, each claim requires that the gas supply line be “connected to the manifold component”.

Itsudo’s gas supply line 12 is connected to the manifold component/chamber 9 (*see* Fig. 6).

PRINCIPLES OF LAW

The burden is on Appellant to identify reversible error in the appealed § 103 rejection. *Cf. In re Kahn*, 441 F.3d 977, 985-986 (Fed. Cir. 2006); *see also* 37 C.F.R. § 41.37(c)(1)(vii).

It is well established that while the features of an apparatus claim may be recited functionally, the apparatus must be distinguished from the prior art in terms of structure, rather than function. *See In re Schreiber*, 128 F.3d 1473, 1478 (Fed. Cir. 1997). Language in an apparatus claim directed to the function, operation, intent-of-use, and materials upon which these apparatus components work (e.g., the identity of the processing gas) that does not structurally limit the apparatus components or patentably differentiate the

claimed apparatus from an otherwise identical prior art apparatus will not support patentability. *See, e.g., In re Rishoi*, 197 F.2d 342, 344-45 (CCPA 1952); *In re Otto*, 312 F.2d 937, 939-40 (CCPA 1963); *In re Ludtke*, 441 F.2d 660, 663-64 (CCPA 1971); *In re Yanush*, 477 F.2d 958, 959 (CCPA 1973).

“[E]vidence establishing lack of all novelty in the claimed invention necessarily evidences obviousness.” *In re Fracalossi*, 681 F.2d 792, 794 (CCPA 1982).

ANALYSIS

Appellants repeatedly contend that the Examiner’s rejection must be overturned because Itsudo does not teach or suggest that the inert gas line connected to the manifold is a “processing gas” that contains “reactive gases” (*see generally*, App. Br.; Reply Br.). Appellants contend that “gas identity” is a “structural limitation in the pending apparatus claims” (App. Br. 22). Appellants further contend Itsudo teaches away from adding reactive gases to its manifold chamber (e.g., App. Br. 10; Reply Br. 10, 11). These contentions are not persuasive of reversible error for the following reasons.

It is axiomatic that claims are given their broadest reasonable interpretation in light of the specification as they would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). Claim 42 merely recites “a processing gas supply line connected to the manifold”, and then further defines the contents (i.e., the identity) of the processing gas. However, the exact nature of the processing gas may only be considered functional language. As such, we are only required to give such language weight to the extent that the prior art

is or is not capable of meeting the functional limitation. *See e.g., In re Schreiber*, 128 F.3d at 1478-1479 (the functional limitations at issue were found to be inherent in the prior art reference).

We agree with the Examiner that the claims at issue are apparatus claims. We further agree with the Examiner that language directed to the function, operation, intent-of-use and articles upon which these apparatus components work does not provide any patentable significance to the claim since this language does not provide further structural limitation to the apparatus components. *See, e.g., In re Ludtke*, 441 F.2d at 663-64; *In re Yanush*, 477 F.2d at 959.

Based on the foregoing, it is reasonable to conclude that the structure recited in claim 42 reads on the structure described in Itsudo. In this regard, lack of novelty is the ultimate or epitome of obviousness. *In re Fracalossi*, 681 F.2d at 794.

Furthermore, the location of Itsudo's gas inlet 12 opening is formed through the manifold cavity/chamber 9 at a location spaced above the lowest surface of the manifold cavity/chamber 9. Accordingly, we determine that based on a broadest reasonable interpretation of the term "an upper surface of the manifold cavity", the location of the gas inlet 12 opening also reads on the claim limitation "formed through an upper surface of the manifold cavity" as set out in independent claim 29.⁷

⁷ Although not necessary in view of our claim interpretation, the evidence of record establishes that the location of a gas inlet opening may be in the upper surface of a manifold cavity and/or through the uppermost reaction device wall (*see, e.g.,* the admitted prior art Fig. 1 or Sivaramakrishnam). Thus, the use of such a location would have been within the level of ordinary skill in the art. *See also, e.g., KSR*, 550 U.S. 398, 420-421 (2007) (one of

Even assuming that “the term ‘processing gas’ necessarily comprises ‘reactive gases’” as Appellants contend (*see, e.g.*, Reply Br. 14), Appellants have not provided any credible evidence or persuasive line of technical reasoning to refute the Examiner’s reasonable inference that Itsudo’s processing gas supply line 12 is capable of handling “non-depleted reactive” processing gases as recited in claim 42. Furthermore, Itsudo describes that prior art photo-CVD devices did include reactive gases which fouled the light-transmitting window and reduced the amount of light (Itsudo, p. 3, para. [0002]). Accordingly, even though Itsudo explains that this was not an optimal arrangement, this further supports that the gas supply line at 12 of Itsudo is capable of handling such reactive gases.

For the foregoing reasons, we agree with the Examiner’s findings in support of obviousness for the subject matter of claim 42, as well as the subject matter of claims 29, 40 and 47, based on the applied prior art.

CONCLUSION

Appellants have not shown that the Examiner reversibly erred in determining that the term “processing gas”, as well as the term “non-depleted reactive gases” are drawn to the intended use of the apparatus claimed. We determine that the terms “processing gas” and “non-depleted reactive gases” only limit the claims to the extent that that the prior art structure must be capable of handling such processing gases as claimed.

Accordingly, we sustain the Examiner’s § 103 rejection of claims 29, 42 and 47 based on the combined teachings of Itsudo and

ordinary skill in the art is “also a person of ordinary creativity, not an automaton”).

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Sivaramakrishnam, as well as the Examiner's § 103 rejection of claim 40 based on the combined teachings of Itsudo, Sivaramakrishnam and Nguyen.

ORDER

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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